A CORRELATION STUDY OF SECOND DESTINATION TRANSPORTATION FUNDING AND VEHICLE MOVEMENT

THESIS

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AFIT/GLM/ENS/03-13

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Duff Wier

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Abstract

HQ AFMC has consistently experienced problems with the Second Destination Transportation budget being under funded. This under funding causes the command to implement control actions on how funds are allocated to ensure that enough funds are available.

This research effort was intended to show the relationship between spending restrictions and how vehicles move between theaters. By identifying whether or not and how the control actions on Second Destination Transportation funding affects inter-theater vehicle movement capabilities, this research seeks to assist those decision makers in making fully informed decisions when allocating scare fiscal resources.

The results of this research indicate that there is not a correlation between spending restrictions and vehicle movement. While the research did not show a correlation, it does not necessarily mean that it does not exist.

A CORRELATION STUDY OF SECOND DESTINATION TRANSPORTATION FUNDING AND VEHICLE MOVEMENT

I. Introduction

Background

In order to clarify a distinction must be made between First and Second Destination Transportation. First Destination Transportation is transportation that is required to deliver items "from a procurement source outside the Department of Defense supply system to the first point at which the Air Force takes possession or ownership" (Department of the Air Force, 2000: 341). Second Destination Transportation (SDT) then is any transportation for items other than First Destination Transportation. SDT funding is used for certain movements of non-Air Force working capital fund materiel. The types of movements that Second Destination Transportation funds use are:

1. CONUS movement from a repair facility
2. Over-ocean movement by the Military Sealift Command or Air Mobility Command
3. CONUS port handling by Military Traffic Management Command
4. OCONUS inter or intra-theater movement by Air Mobility Command or Military Sealift Command
5. CONUS inter-Major Command movements when item manager directed (Department of the Air Force, 1999: 64).

Examples of items moved using Second Destination Transportation (SDT) include munitions, aircraft engines, vehicles, and investment items managed on an Air Force Table of Allowance, purchased with acquisition money (Department of Defense,

2000: CC-11-5-3). In order to narrow the scope of this thesis, a single commodity group was chosen based on the input from the thesis sponsor. This commodity group was vehicles. Examples of the types of vehicles that are moved using SDT funds are Airfield Specialized Trucks, Passenger Motor Vehicles, Trucks and Truck Tractors, Trailers, Earth Moving and Excavating Equipment, Cranes and Crane Shovels, Road Clearing and Cleaning Equipment, and Fire Fighting Equipment (Department of the Air Force, 1999: 68 and DLA, 2002: IV-2,3,5,6).

SDT funding is centrally managed and allocated at HQ AFMC. Over the past several years, the SDT budget has been under funded. This decrease in funding has forced decision makers to implement control actions in order to target funds and provide the best support possible to the warfighter within a limited budget. Many of the major commands have expressed concern that these control actions will adversely affect the way that vehicles flow in and out of theaters and will create a negative mission impact. (Wojcik, 2002).

Problem Statement

Decision makers at AFMC need to know how implementing control actions on funding for Second Destination Transportation affects the capability to move vehicles in out of a theater to support the warfighter. By identifying whether or not and how the control actions on Second Destination Transportation funding affects inter-theater vehicle movement capabilities, this research seeks to assist those decision makers in making fully informed decisions when allocating scare fiscal resources.

Research Question

Is there a correlation between Second Destination Transportation funding levels and the capability to move vehicles in and out of a theater?

Investigative Questions

a. How is the Second Destination Transportation budget determined?

b. How is funding allocated?

c. How are Second Destination transportation requirements determined?

d. How are those requirements prioritized?

e. What happens if funding is depleted?

f. How is vehicle movement measured?

g. Is there a correlation between funding levels and vehicle movement measurements?

Methodology

The basic methodology for this study is a quantitative method using a pre-experimental design of one-group pretest-posttest. The methodology will use analysis of funding and vehicle movement measures to:

1. Determine if there is a statistical difference between vehicle movement measures during the times of restricted and unrestricted spending.
2. If question 1 has a statistical difference, determine what kind of correlation there is between restricted spending and actual vehicle movement measures.

Assumptions and Limitations of the Research

This research assumes that the policies and procedures for management of SDT funding are being correctly followed and implemented by HQ AFMC personnel. Additionally, this research assumes that the data maintained in Air Force systems is complete and reliable. The main limitation of the study is that it is limited to one commodity, vehicles. This research lays the groundwork to analyze other commodities and expand the body of knowledge and understand of how funding affects cargo movement.

Expected Benefits of Research

Currently, HQ AFMC cannot provide a convincing defense when SDT funding is cut. This thesis research, at the very least, will provide AFMC decision makers with a quantifiable understanding of how funding restrictions affect vehicle movement. Additionally, that understanding may be used to provide real justification for how cutting SDT funding affects vehicle movement capabilities and mitigate potential SDT funding cuts. Also, this research provides an analysis framework that can be applied to all commodities requiring SDT funding that can be expanded to include mission impacts.

II. Literature Review

Overview

A literature search was conducted to determine the relevance of previous SDT research. Previous research and reports were reviewed to gain a better understand of the SDT process. Additionally, DoD regulations and Air Force instructions were reviewed to gain an understanding of the processes and procedures currently being applied to managing SDT funds. Finally, a review of potential impacts due to delays in SDT shipments collected by Warner-Robins Air Logistics center was conducted to gain a better understanding of how customers would be impacted by shortfalls in SDT funding.

Previous SDT Research

The purpose of this section is to present previous research findings concerning SDT funding and forecasting by examining the following research:

1. Lamb and Sarnacki Research (1978)
2. Strom Research (1989)
3. Moore Research (1990)

Lamb and Sarnacki Research (1978). In this research, Captain Christopher J. Lamb and Captain Joseph B. Sarnacki developed a method to compute future tonnage estimates used to calculate SDT budget requirements. Their method used discontinuous linear regression with flying hours and manpower as independent variables. Since the method developed was intended for forecasting, it has little applicability to the current research being conducted (Lamb and Sarnacki, 1978: 37).

Strom Research (1989). This research, conducted by Captain Stephen L. Strom, analyzed a previously used forecasting method for computing tonnage estimates. Captain Strom found that the method being used was invalid and developed a better model for predicting tonnage estimates. The research developed a new model using a Box-Jenkins time-series forecasting model. Again, since the method developed was intended for forecasting, it has little applicability to the current research being conducted (Strom, 1989: 80-83).

Moore Research (1990). This research, conducted by Captain Kevin R. Moore, developed multiple regression and neural network models for predicting general cargo tonnage requirements that were better than the models currently in use. Again, since the method developed was intended for forecasting, it has little applicability to the current research being conducted (Moore, 1990: 149-152).

Previous SDT Studies and Audits

The purpose of this section is to present previous findings on the management of SDT funding by examining the following reports:

1. LMI Report (1976)
2. Simmons Report (1986)
3. AFLMA Report LT9411800 (1996)
4. DoD Audit Report 97-040 (1996)
5. AF Audit Agency Report 99054008 (2000)

LMI Report (1976). This report, prepared by Eugene A. Narragon and Jerome M. Neil, was requested by the Assistant Secretary of Defense (Installations and

Logistics). The purpose of the report was to evaluate the services' control of SDT funds and determine if the funds were being used in a cost effective manner (Narragon and Neil, 1976: 1).

The report found many problems with the services' management of SDT funds and linked those problems to the following three principle causes:

1. Rate changes: Changes in rates occur because of numerous economic pressures upon commercial carriers and Single Manager Operating Agencies (e.g. an increase in the cost of fuel).

2. Workload changes: Changes in workload occur because distribution patterns are modified through force level changes, repositioning of stocks, and the like.

3. Policy Decisions: Service and OSD policy decisions can have a direct effect upon the total Service SDT program. These decisions may result in changes in transportation modes or workload (Narragon and Neil, 1976: 61).

Additionally, the report recommended that quarterly reviews of SDT budgets and spending should be performed (Narragon and Neil, 1976).

Simmons Report (1986). This report, prepared by Kenneth R. Simmons, reviewed the methods used by the services to manage SDT funds. The report found that the Navy and Air Force centrally managed the process while the Army's management was decentralized. The report found that the data needed to complete SDT budget estimates was incomplete and ultimately made recommendations on how to better control and improve the SDT accounting system (Simmons, 1986).

AFLMA Report LT9411800 (1996). This report, prepared by Captain Inez A. Sookma, sought to determine:

1. If SDT Budget estimations are correct.
2. If Transportation Account Codes (TAC) are being properly assigned.
3. If the financial systems are properly processing bills for payment (Sookma, 1996: 1).

The report found the following:

1. The budget estimation process was not completely reliable and historical data was incomplete.
2. Too many Transportation Account Codes were being used.
3. Airlift bills were not validated in a timely manner (Sookma, 1996: 19-20).

DoD Audit Report 97-040 (1996). This audit, prepared by the DoD Inspector General, sought to determine is SDT costs were correctly charged and evaluate management controls of Defense Business Operating Fund (DBOF) usage for SDT. The audit found numerous erroneous charges and a need for improved management control (Department of Defense, 1996).

AF Audit Agency Report 99054008 (2000). This audit, conducted by the Air Force Audit Agency, sought to determine if AFMC implemented adequate controls to prevent over obligation and over expenditure of the SDT centrally managed allotment (CMA) funds. The agency used data from the DFAS General Accounting and Finance System. The audit found that procedures to reconcile billing, obligations, and expenditures were not fully implemented. As a result $4.2 million of a $119.4 million budget was improperly charged (Air Force Audit Agency, 2000). This could have a direct impact on the research currently being conducted since it is assumed that policies and procedures are being properly followed and implemented.

DoD Regulations and AF Instructions

The purpose of this section is to discuss DoD regulations and AF instructions as they apply to SDT funding and vehicle movement. The following sources were reviewed:

1. Defense Transportation Regulation
2. Air Force Instruction 24-201, Cargo Movement

Defense Transportation Regulation. The Defense Transportation Regulation (DTR) is an overarching regulation for all transportation policy in the DoD. The review of the document was focused on Appendix CC-11, Transportation Account Code (TAC) Policy and Procedures and Appendix CC-10, Uniform Material Movement and Issue Priority System (UMMIPS) Standards.

According to the DTR, TACs are used to "link movement authority, funding approval, and accounting date for shipments of cargo and personal property in the Defense Transportation System" (Department of Defense, 2000: CC-11-1). The TACs used by the Air Force to fund SDT are paid from two types of funds: Air Force Working Capital Funds (AFWCF) and SDT Centrally Managed Allotment (SDT/CMA) (Department of Defense, 2000: CC-11-5-2). The AFWCF is a revolving fund (Department of Defense, 2000: CC-11-5-2). Essentially, this means that the fund pays for transportation costs and is reimbursed by the requisitioner of the item (Department of Defense, 2000: CC-11-5-2). Alternatively, the SDT/CMA pays for movements of non-Working Capital Fund materiel (i.e. vehicles) (Department of Defense, 2000: CC-11-5-3). However, the requisitioner does not reimburse this fund, and management

responsibility for the SDT/CMA belongs to AFMC LSO/LOT (Department of Defense, 2000: CC-11-5-3). AFMC LSO/LOT is required to submit annual SDT budget requirements to fund the movement of non-Working Capital Fund materiel (Wojcik, 2002). This process will be covered in a later section of the literature review.

Table 1 below is the UMMIPS standards for Transportation Priories 1 and 2, respectively.

Table 1. UMMIPS Standards (DoD, 2000: CC-10-3,4)

	Area Standards (Days)			
Transportation Priority	A	B	C	D
1	2.5	2.5	2.5	4.5
2	3.5	3.5	3.5	5.5

The areas are defined as follows:

> Area A. To locations in the vicinity of Alaska (Elmendorf AFB); Hawaii (Hickam AFB); North Atlantic (Thule AB, Greenland, and Naval Air Station Keflavik, Iceland); Caribbean (NAS Guantanamo Bay, Cuba, and Naval Station Roosevelt Roads, Puerto Rico); and Central America. (DoD, 2000: CC-10-1)
>
> Area B. To locations in the vicinity of United Kingdom (RAF Mildenhall England) and Northern Europe (Ramstein AB, Germany, Rhein Main AB Germany, and Lajes AB, Protugal (Azores)). (DoD 2000: CC-10-1)
>
> Area C. To location in the vicinity of Japan (Yokota AB and Kadena AB (Okinawa)); Korea (Osan AB); Guam (Andersen AFB); and Western Mediterranean (Spain (Naval Station Rota), Italy (Aviano AB, NAS Sigonella, Olbia, and Naples)). (DoD 2000: CC-10-2)
>
> Area D. Hard lift areas- all other destinations not listed as determined by United States Transportation Command. (DoD 2000: CC-10-2)

Air Force Instruction 24-201, Cargo Movement. The primary reason for reviewing AFI 24-201 is to gain an understanding of how transportation priorities are assigned and what mode of shipment eligibility for each of the priorities. There are four distinct transportation priorities (TP). The first is TP-1 (Expedite). This priority is given to shipments with a supply priority designator between 1 and 3 or if a shipment has two days or less until the required delivery date (RDD) for CONUS shipments and seven days or less for overseas shipments (Department of the Air Force, 1999: 14). TP-2 (Expedite) is assigned to shipments with a RDD of more than two days but less than five days for CONUS shipments and more than seven days but less than 22 days for overseas shipments (Department of the Air Force, 1999: 14). TP-3 (Routine) is assigned to shipments with a supply priority between 4 and 15 without a RDD (Department of the Air Force, 1999: 14). Finally, TP-4 (Deferred Air Freight) is the lowest transportation priority.

TP-1 and TP-2 shipments are eligible for airlift, but non-AFWCF shipments, like those shipped using SDT/CMA, may be limited due to funding availability (Department of the Air Force, 1999: 15). TP-3 shipments are only eligible for surface modes (i.e. truck or sealift) (Department of the Air Force, 1999: 15). Finally, TP-4 shipments are moved by AMC on a space available basis (Department of the Air Force, 1999: 15).

Current SDT Budget and Funds Management Process

HQ AFMC LSO personnel were interviewed to determine how SDT funds were managed. Figure 1 below illustrates the current process of managing SDT funds.

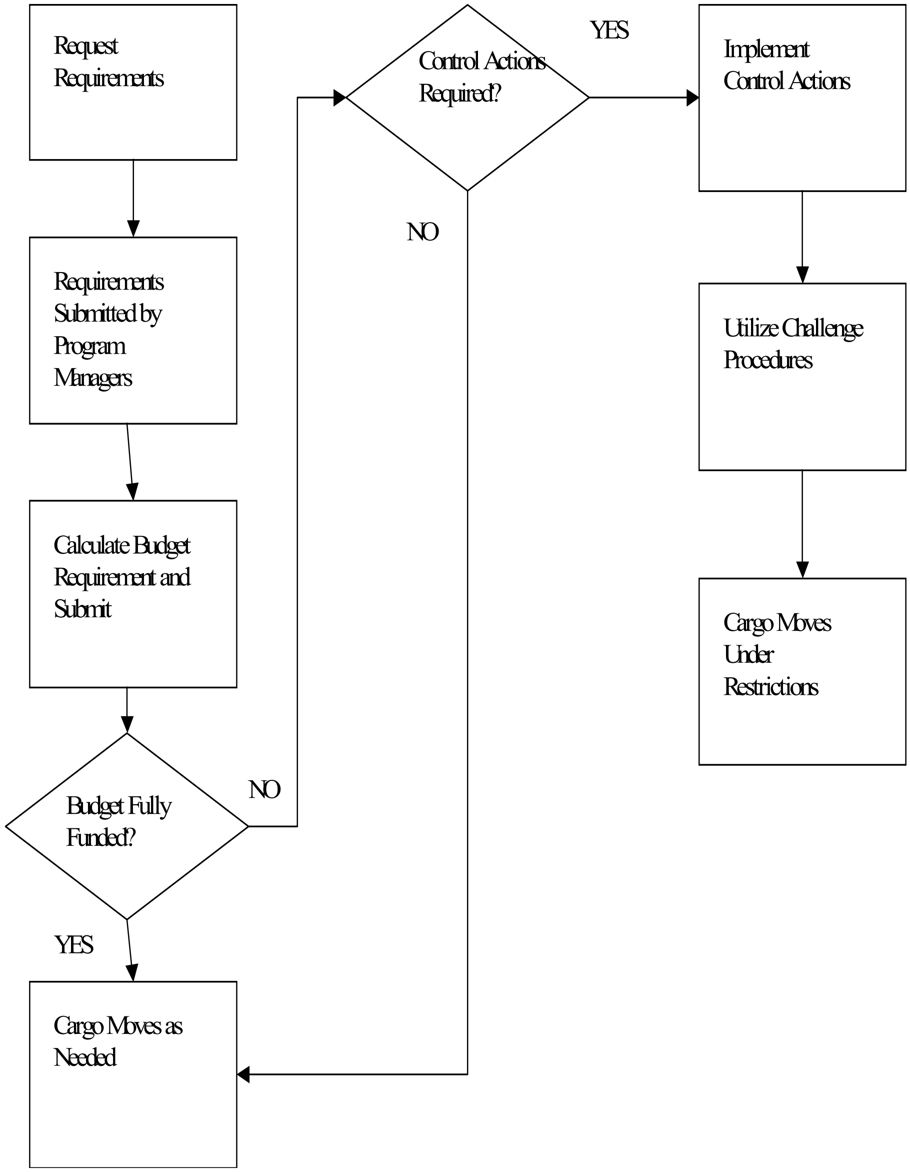

Figure 1. SDT Funding Process (Smith, 2002 and Wojcik, 2002)

The process flowchart in Figure 1 is not all-inclusive, but does give an overall picture of how SDT funds are managed. HQ AFMC LSO personnel request requirements from program managers who in turn submit the amount of items and desired mode that they will be shipped (Wojcik, 2002). At this point HQ AFMC LSO personnel calculate

and submit an overall budget requirement for all SDT items (Wojcik, 2002). Then the budget requirement is either approved or reduced. Historically, the budget requirement has consistently been reduced (Wojcik, 2002). Once the reduced budget is approved, HQ AFMC LSO personnel must monitor the sending of the SDT funds and determine when and if to implement control actions to restrict the movement of cargo using SDT funds (Wojcik, 2002). When control actions are implemented, a message outlining the control actions is released, and cargo challenge procedures are updated (Smith, 2002). The challenge procedures should only be utilized if organizations shipping cargo does not follow the published control actions (Smith, 2002).

SDT Impacts

The purpose of this section is to document the potential mission impacts that the different major commands expressed concerned about occurring when spending for SDT vehicle movement is restricted. Table 2 below summarizes those concerns.

Table 2. SDT Impacts (Humphreys, 2001)

Command	Impacts
USAFE	Aircraft Maintenance
	Munitions Maintenance
	Rapid Runway Repair
	Force Protection
	Deployed Operations
PACAF	Sortie Production
	Rapid Runway Repair
	Force Protection
	Refueling Operations
	O&M Funds
AMC	O&M Funds/Budget
AFSPC	Increased Maintenance Costs

Table 2 illustrates that there is a wide range of potentially severe impacts that the major commands could encounter due to under funding SDT.

III. Methodology

Overview

No previous research was found that compared the impact of restricting spending for vehicle movement, either in the DoD or in the civilian sector. Therefore, a methodology was developed in order to show the relationship between restricting spending and vehicle movement. First a model and constructs are defined to focus on the relationship of restricting spending and vehicle movement. Next, the data collection methods will be defined. Finally, two specific methodologies are developed for the specific data characteristics in order to compare the relationship between restricting spending and vehicle movement.

Model Definition

The general model in Figure 2 below illustrates how restricted spending and vehicle movement fall into the continuum of budgeting to mission impact.

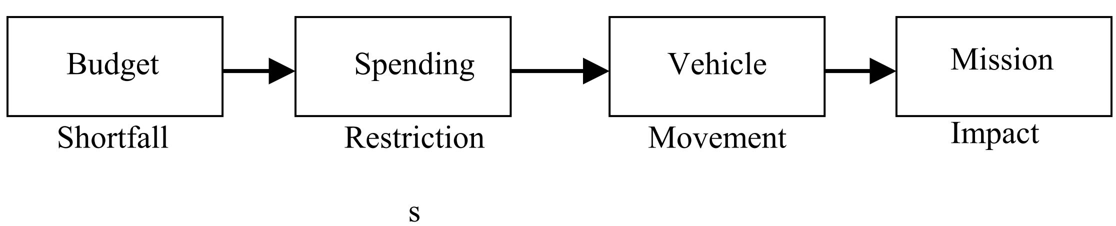

Figure 2. General Model

This was developed through the literature review. The sponsor of this research was not concerned about how budget shortfalls affect spending restrictions, primarily because it falls into the realm of their control. Base on that assumption, this research

assumes that budget shortfalls cause spending restrictions. Also, this research was focused on understanding the relationship of restricted spending and vehicle movement; therefore, the relationship between vehicle movement and mission impact is an area for future research. The constructs of budget shortfall and mission impact are removed from the general model, the specific model illustrated in Figure 3 below remains.

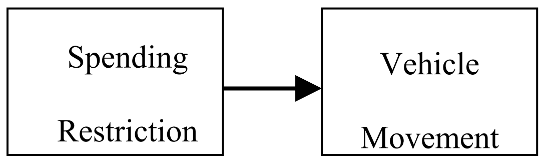

Figure 3. Specific Model

The construct of Spending Restriction is defined as any control action implemented by the SDT program manager. The construct of Vehicle Movement is defined as the period of time from when a vehicle arrives at its port of embarkation and departs its port of debarkation. This time period was chosen because the literature review indicated that this was the period of time that would be the most impacted by control actions by the SDT program manager.

Data Collection

Data for analysis will be collected in three phases. First, data will be collected on when HQ AFMC LSO implemented control actions on vehicle shipments. Then, data will be collected from the Financial and Air Clearance Transportation System (FACTS). Finally, data will be collected from the Global Air Transportation Execution System (GATES).

Control Action Data Collection. Data will be collected on SDT control actions by reviewing messages sent by HQ AFMC that implemented control actions on SDT shipments. The messages will give the time periods when the control actions are implemented and when they are lifted.

Financial and Air Clearance Transportation System (FACTS) Data. FACTS data is gathered by submitting a request to HQ AFMC/LSO. The data requested was for all shipments from 1 October 1999 to 30 September 2002 that used transportation account code F8WR. The requested fields included: Status, Transportation Priority Code, Port of Embarkation (POE), Port of Debarkation (POD), Transportation Control Number (TCN), Shipped Date, Weight, and Cube. The LSO/LOT chief analyst, Chris Arzberger, recommended these fields. The data was forwarded as a Microsoft Excel file.

Global Air Transportation Execution System (GATES) Data. GATES data was gathered by submitting a request to HQ AMC/DONV. The data requested was for all shipments from 1 October 1999 to 30 September 2002 that used transportation account code F8WR. The requested data fields included: TCN, POE Receipt Date, POD Lift Date, Weight, POE, POD, and Transportation Priority. The LSO/LOT chief analyst, Chris Arzberger, recommended these fields. The data was forwarded as a Microsoft Excel file.

FACTS Data Methodology

The FACTS data will by analyzed by a quantitative analysis using a one-group pretest-posttest design (Leedy and Ormrod, 2001: 235). Figure 4 below illustrates this design.

Group	Time --->		
Group 1	Observation	Treatment	Observation

Figure 4. One-Group Pretest-Posttest Design (Leedy and Ormrod, 2001: 235)

The treatment in this methodology is the presence of spending restrictions. The observations that will be measured will be the total average change in the UMMIPS Standards due to shipments being challenged by the Air Clearance Authority. The FACTS data will show when a shipment was challenged and whether or not it was downgraded to a lower priority. For each shipment that was challenged and downgraded, the corresponding change in UMMIPS standards can be calculated. Once all of the changes are calculated, then the total average change can be calculated.

Statistical Hypothesis testing will be used to show whether or not the Treatment is statistically different from the Observations.

The first null hypothesis is that the average change in the UMMIPS standards for the first observation and the treatment are equal, or that their difference equals zero. The corresponding alternative hypothesis is that the average change in the UMMIPS standards for the Treatment is greater than the average change in the UMMIPS standards for the first observation, or that their difference is greater than zero (Devore, 2000: 356). The second null and alternative hypotheses are the same as the first, but the first observation is replaced by the final observation.

GATES Data Methodology

Since the GATES data is "actual" movement information, it must be correctly grouped before it can be analyzed. Using the UMMIPS standards and areas previously discussed in the literature review, the data will be sorted using the port of debarkation. Then each of the ports will be assigned to the UMMIPS Area A, B, C, or D that were discussed previously. These groupings will then be used for the methodology. The GATES data methodology will be identical to the FACTS data methodology except that the Treatment will now be the average shipment time during spending restrictions, and the Observations will be the average shipment times without spending restrictions. The hypothesis testing will be performed on each of the four groups of data.

Finally, simple linear regression will be used to analyze the groups of data. The independent variable will be a dummy variable indicating the presence (1) or lack of spending restrictions (0), and the dependent variables will be the shipment time, shipment weight, and Transportation Priority. These variables were chosen after discussions with personnel a HQ AFMC (Arzberger, 2002; Smith, 2002; Wojcik, 2002). This will attempt to show the amount of correlation between spending restrictions and vehicle movement times that is present in the real world data.

Internal and External Validity

There are many factors that can impact the time that it takes for cargo to move from point A to point B. These factors could include weather, broken aircraft, frustrated cargo, etc… The FACTS data methodology was designed to help isolate those confounding variables. In order to protect against these factors, the average change in

UMMIPS standard was used. The UMMIPS standards can be defined as the maximum expected time for cargo movement. Since a difference of these expected times was taken, the difference is then the expected increase in shipment time. This isolates the impact of just the funding restriction. In order to protect against other factors that causing shipments to be challenged. These factors are controlled for statistically by comparing the change in UMMIPS standard both during and without spending restrictions. Additionally, personnel responsible for implementing challenge procedures were interview. They stated that vehicles were rarely challenged unless spending restrictions were in place (Smith, 2002).

The GATES data methodology was designed to test the external validity of the FACTS data methodology. The hypothesis testing will reveal whether or not there is an actual difference in the actual average shipment times. Additionally, the regression analysis will reveal the amount of correlation between spending restrictions and vehicle movement times that is present in the real world data.

IV. Analysis and Results

FACTS Data Analysis

After reviewing the HQ AFMC control messages, it was determined that control actions were in place from 1 June 00 to 30 September 01. This period of time was the treatment period used to compare the theoretical average change in shipment time for the FACTS Data. The null hypothesis being tested is that $\mu1 = \mu2$, where $\mu1$ is the average change in shipment time due to shipments being challenged during the treatment period and $\mu2$ is the average change in shipment time during the non-treatment period. The alternative hypothesis is the $\mu1$ is not equal to $\mu2$ (Devore, 2000: 653). The data revealed that there were no challenges of any shipments. Therefore, the null hypothesis could not be rejected. There was not a statistical difference between the change in shipment time during the period of restricted spending and the periods without restricted spending.

GATES Data Analysis

After looking at the distributions of the actual shipment times, it was determined that the data was nonnormal and it was concluded that Wilcoxon Rank-Sum test would be the best way to analyze the data. This assumes that the distributions have the same approximate shape and spread (Devore, 2000: 659). The distributions were compared and did have approximately the same shape and spread. The null hypothesis being tested by the Wilcoxon Rank-Sum test is that $\mu1$ minus $\mu2$ is equals zero, where $\mu1$ is the average shipment time during restricted spending and $\mu2$ is the average shipment time

without spending restrictions. The alternative hypothesis is that $\mu1$ minus $\mu2$ is not equal to zero. Since, all the samples used were larger than eight, a normal approximation can be used (Devore, 2000: 662). Since a normal approximation was used, the test statistic used was Z (Devore, 2000:663). In order to reject the null hypothesis the Z statistic would have to be greater than 1.96 or less than –1.96 using an alpha of .05. The SAS Institute's JMP 4.0 software package was used to calculated the test statistic. Table 3 below summarizes the test statistic for each of the groups of data.

Table 3. Test Statistic by Area

Area	Z
A	-3.69
B	-0.58
C	0.16
D	-0.74
Alaska	1.43
England	-1.62
Germany	0.30
Hawaii	0.18
Italy	-1.11
Japan	2.87
Korea	-0.27
Southwest Asia	3.04
Turkey	-0.30

Only three of the areas that were compared had a significant difference needed to reject the null hypothesis and claim that there is a difference between the average times. These areas were A, Japan, and Southwest Asia. The test statistic indicates that area A's average time was actually less during restriction while the areas of Japan and Southwest Asia indicated a larger average time during restricted spending.

The ratio of airlift shipments to sealift shipments was calculated for the time periods of pre-restriction, during restriction, and post restriction. This was done to test to see if restricted spending forced more cargo to go by sealift and thereby decreasing the ratio. Table 4 below summarizes the ratios by area.

Table 4. Airlift/Sealift Ratios

Area	Pre	Restriction	Post
A	0.84	0.90	0.67
B	0.50	0.48	0.13
C	0.29	0.26	0.10
D	1.85	0.56	0.57
Alaska	1.96	1.54	0.22
England	1.25	0.86	0.13
Germany	1.75	0.72	3.00
Hawaii	0.18	0.69	0.67
Italy	4.25	0.29	0.27
Japan	0.36	0.37	0.21
Korea	0.17	0.41	0.07
Southwest Asia	0.06	0.09	0.34
Turkey	0.60	0.35	0.88

There was not a consistent pattern to indicate a decrease in the ratio during spending restriction.

Finally, a linear regression was calculated to determine if there was a linear correlation between spending restrictions and vehicle shipment times. The regression formula is transportation time equals an intercept plus a restriction value plus a weight value plus a transportation priority value. Table 5 below summarizes the R squared values for each of the regressions by area.

Table 5. Regression R Squared Values

Area	R squared
A	0.075
B	0.102
C	0.125
D	0.03
Alaska	0.005
England	0.094
Germany	0.096
Hawaii	0.026
Italy	0.061
Japan	0.076
Korea	0.357
Southwest Asia	0.137
Turkey	0.137

None of the regressions yielded an R squared value over .36. This indicates that the regressions do not explain the variability in the data very well. Table 3 below summarizes each of the regression parameters by area.

Table 6. Regression Parameters

Area	Parameter					
	Restriction	p value	Weight	p value	Transportation Priority	p value
Area	-12.89	0.003	0.0003	0.08	-4.02	0.23
B	2.04	0.35	0.000005	0.92	4.47	0.0001
C	-3.31	0.22	0	0.7	4.89	0.0001
D	-0.99	0.69	0.0005	0.0006	0.46	0.78
Alaska	-1.93	0.47	0.0001	0.53	-1.24	0.63
England	-1.21	0.46	-0.00004	0.47	1.52	0.026
Germany	2.43	0.67	-0.00002	0.87	5.22	0.021
Hawaii	1.2	0.56	0.00002	0.65	0.18	0.83
Italy	-1.9	0.63	0.0004	0.009	16.05	0.001
Japan	5.27	0.18	0.0002	0.11	0.8	0.65
Korea	-2.46	0.087	0.0001	0.16	3.41	0.001
Southwest Asia	17.81	0.041	0.001	0.0004	0.43	0.92
Turkey	-6.19	0.386	0.0014	0.177	2.79	0.73

Not only were the overall regressions not very significant, but the only areas that indicated there was a significant linear correlation between restricted spending and vehicle movement times was for Area A and Southwest Asia. Area A has a negative relationship while Southwest Asia had a positive relationship.

Investigative Questions

a. How is the SDT budget determined? This question was answered by the literature review and personal interviews with personnel at HQ AFMC LSO. The SDT

budget is determined by requesting requirements for items and shipment mode from program managers. The requirements and shipment mode are then used to calculate the budget submitted for approval.

b. How is funding allocated? Funding is allocated from a centrally managed fund.

c. How are Second Destination transportation requirements determined? As stated earlier, these requirements are determined by the program manager.

d. How are those requirements prioritized? Based on the literature review and interviews with HQ AFMC LSO personnel, there is not a method used to prioritize SDT shipments

e. What happens if funding is depleted? This have never happened, and HQ AFMC LSO personnel managing the funding would take action to restrict spending in order to prevent the complete depletion of funds.

f. How is vehicle movement measured? Vehicle movement is measured by the time it takes the vehicle to move from POE to POD.

g. Is there a correlation between funding levels and vehicle movement measurements? Based on the results discussed earlier, this research was unable to determine if there is a correlation between funding levels and vehicle movement measurements.

V. Conclusions and Recommendations

Chapter Overview

This section of the paper will provide conclusions on the results of the research. It will continue by discussing the limitations discovered in the process of conducting the research. Finally, this section is followed by recommendations for future research.

Conclusions

The overall conclusion of this research is that the current data available does not indicate a correlation between SDT funding levels and vehicle movement. The majority of the analysis was unable to conclude that there is a difference between the average time to move a vehicle with and without spending restrictions. In the few cases where the statistics indicated that there was a difference, there was conflicting information from the test statistics. An example of this would be a comparison of shipments to Area A and Southwest Asia. The test statistic for shipments to Area A indicated that the average movement time during restricted spending was less than that when there was no spending restriction. Additionally, the test statistic for shipments to Southwest Asia indicated that the average movement time during restricted spending was greater than when there was no spending restriction. These two results are in direct conflict with each other.

Limitations

A major limitation discovered during this research is that there is a great deal of management oversight missing in the process. This became apparent during the FACTS data analysis. When there were no challenges to any shipments for three years worth of

data, suspicions were raised that there may be a lack of management oversight in the process. There were a total of 310 shipments to areas A, B and C that potentially should have been challenged, but none of them were. This also raised the concern that the management procedures may not be properly followed.

Future Research

Future research may be warranted. First, if AFMC is concerned about other commodities being shipped with SDT funding, this research lays the ground work to conduct similar research on those commodities. Additionally, this research may be repeated for future vehicle data once there is more management control in the process.

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Vita

Captain Stephen D. Wier was born in Longview, Texas. After graduating from Longview High School in 1991 he went on to earn his Bachelors Degree from the United States Air Force Academy and was commissioned in May of 1995.

In his first assignment at Seymour Johnson Air Force Base, North Carolina, then Second Lieutenant Wier was assigned to the 4th Supply Squadron and served as the Fuels Management Flight Commander and Materiel Storage and Distribution Flight Commander. In October of 1998 First Lieutenant Wier was assigned to Kunsan Air Base, Republic of Korea. While at the "Wolfpack", Captain Wier served as the Combat Operations Support Flight Commander. In October 1999, Captain Wier was assigned to Eglin Air Force Base, Florida. There he served as the Management and Systems Flight Commander in the 96th Supply Squadron.

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14. ABSTRACT

HQ AFMC has consistently experienced problems with the Second Destination Transportation budget being under funded. This under funding causes the command to implement control actions on how funds are allocated to ensure that enough funds are available. This research effort was intended to show the relationship between spending restrictions and how vehicles move between theaters. By identifying whether or not and how the control actions on Second Destination Transportation funding affects inter-theater vehicle movement capabilities, this research seeks to assist those decision makers in making fully informed decisions when allocating scare fiscal resources. The results of this research indicate that there is not a correlation between spending restrictions and vehicle movement. While the research did not show a correlation, it does not necessarily mean that it does not exist.

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